



Innovation research in value chains

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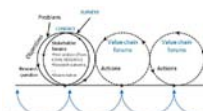
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Your input to *ICROFSnews*

We listen to our readers' response with pleasure, as we are here for you!

Therefore, any responses are more than welcome, be it about the new format, suggestions to improvements, changes, content or anything you can think of.

Contact us at: simon.rebsdorf@icrofs.org



CORE Organic II second call

There will be a second CORE Organic II call launched in early October 2011. Deadline for pre-proposals will be mid-January 2012. When the call is launched, an ICROFS news feed will be sent to the subscribers. More details in early October on www.coreorganic2.org.



CORE Organic research seminar in Paris

The eight pilot projects of CORE Organic running from 2007 to 2010/11 have all finished now. Therefore, the results of these projects will be presented at a CORE Organic II research seminar in Paris on 29 November 2011, together with the plans in the 11 new CORE Organic II projects that will start up during the next 6 months.

All project managers from the research projects in CORE Organic I and II have been invited. Please send an E-mail to coreorganic@icrofs.org if you wish to receive the agenda and more information, when available.



ICROFS in Korea and China

ANSOFT workshop in Korea

Four ICROFS staff will participate at the workshop of the Asian Network for Sustainable Organic Farming Technology, ANSOFT, in Suwon near Seoul, Korea, on September 26-28 2011. 11 participants from 11 ANSOFT member countries will be present at the workshop.

The ICROFS staff will present on the following topics: Strengthening Europe-Asia research collaboration in organic agriculture; The open-access research archive Organic Eprints; and Dissemination techniques on organic agriculture research. The seminar includes a field trip to visit a Korean folk village, organic rice and pear farms.

The ANSOFT workshop is arranged by National Academy of Agricultural Science (NAAS), RDA and the Asian Food and Agriculture Cooperation Initiative, AFACI.



Read more at the AFACI/ANSOFT website: www.afaci.org

ICROFS attends OWC/ISOFA in Korea

In addition to the overall participation of ICROFS in IFOAM's Organic World



Congress, OWC, and the 3rd Scientific Conference ISOFA congress, ICROFS' International Board will make use of the occasion of the world congress to have their ICROFS status and strategy meeting.

Together with ISOFA, ICROFS will share an information booth in the ISOFA tent.

Read more about OWC and the ISOFA congress at www.kowc2011.org/eng/index.asp.

As part of the Korean tour, two of ICROFS' staff will also visit Beijing, China, to attend a scientific conference there.

Organic eprints

Organic Eprints is now OpenAIRE Compliant

"This is a benefit for both the users and authors of research results from organic food and farming" says Organic Eprints coordinator, Ilse A. Rasmussen.

Organic Eprints, the main subject repository for research in organic farming, is now compliant with the OpenAIRE guidelines.

In return, the peer-reviewed results of EC-funded research in organic farming are now exposed to a wider community and the international research collaboration in organic farming will become even more visible through the OpenAIRE portal.

Read more at www.icrofs.org.





ICROFS meets EPOK

Two representatives of the Swedish Centre for Organic Food and Farming, EPOK, met with ICROFS in mid-September to discuss future research and dissemination collaboration and to share experience.

EPOK works with the collaboration, coordination and information on organic agriculture in a Swedish, Nordic and international perspective. EPOK is a resource for the entire Swedish University of Agricultural Sciences, SLU, for communications with the outside world and to coordinate and initiate research and education. No formal arrangements were made, but some future dissemination collaboration has been agreed upon so far.

Read more about EPOK at the website www.slu.se/en/collaborative-centres-and-projects/epok-centre-for-organic-food-and-farming/

Towards a social research platform for agriculture and aquaculture

The VOA3R project platform aims to provide an online social networking platform.



The objective is to use metadata and semantics technology to deploy a community-focused integrated service for research content and data. It will allow users to express their research activities using explicit models of the scholarly methods and procedures used.

The community approach will enable the enhancement of information seeking with extended evaluation elements that go beyond the traditional, anonymous peer review process, which results are not made available openly.

ICROFS participates in the VOA3R project. Read more at <http://aims.fao.org/newsletter/03/VOA3R>

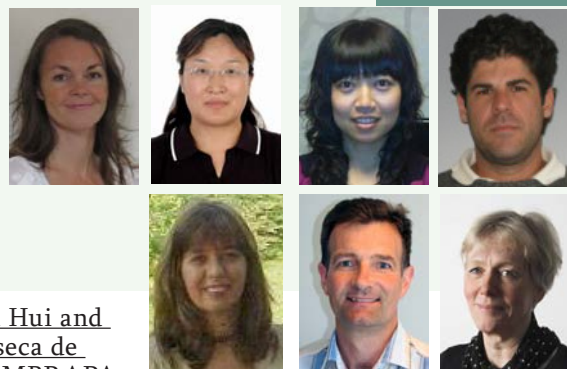


New ICROFS phone numbers

ICROFS has got new telephone numbers. All the new phone numbers of the ICROFS staff can be found at ICROFS' staff webpage:

www.icrofs.org/Pages/About_ICROFS/staff.html

Transport is important in the carbon footprint of imported organic plant products



By: Marie Trydeman Knudsen, Aarhus University, Denmark, Qiao Yu Hui and Luo Yan, China Agricultural University, Beijing, China; Gustavo Fonseca de Almeida, Aarhus University, Denmark; Lucimar Santiago de Abreu, EMBRAPA Environment, Brazil, Niels Halberg, ICROFS, Denmark and Vibeke Langer, University of Copenhagen, Denmark.

Farmers or consumers may ask about the environmental implications when choosing organic products from afar. Is it sustainable to buy organic products from China or South America?

How much does the long-distance transport affect the climate and carbon footprint of the products? And does the organic production in the countries concerned benefit the environment? These are some of the questions raised – and the point of departure for a recently finalized PhD study.



Organic apples from Argentina, organic peppers from Israel and organic orange juice from Brazil – these are some of the products you will find in your local supermarket when you are considering what to buy. The organic products on shelf are not always produced in Denmark but imported from all over the world. Actually, the import

of organic products to Denmark has seen a four to five fold increase since 2003. The increased import of organic products is not only visible in the supermarket. Many organic farmers also feed their cattle with organic soybean from China or Italy.

Import of organic products to Denmark
Organic soybeans from China and organic orange

juice from Brazil was chosen as relevant case studies from the many organic products imported to Denmark. Figure 1 illustrates examples of organic products imported to Denmark.

China has seen a rapid development in the organic sector – and represents along with Brazil the country that has the largest export from Asia and South America, respectively. The

extraordinary growth in the major organic markets in Europe and North America offers promising export opportunities – and China and Brazil represents some of the countries with the largest areas grown organically.

Life cycle assessment of soybean and orange juice
We used Life Cycle Assessment (LCA) as a tool

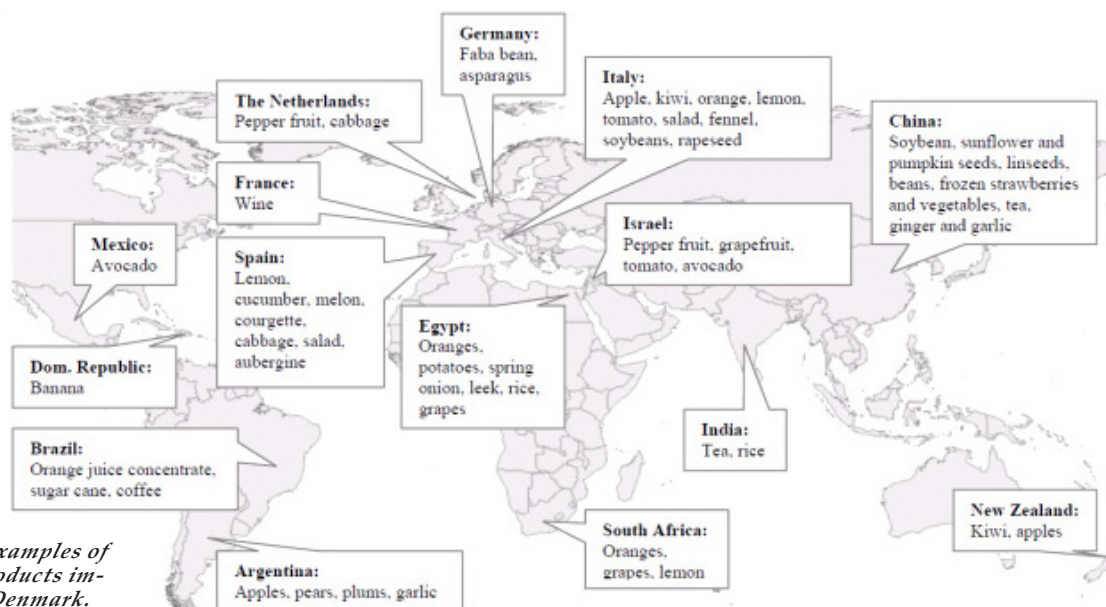


Figure 1. Examples of organic products imported to Denmark.



to calculate e.g. how much transport matters, with regard to climate and environment, when organic soybeans are imported from China to Denmark.

Life Cycle Assessment include all the relevant environmental impacts from the product chain – from the production of fertilizer and other inputs, over the emissions at the farm to the product ends up in the supermarket. Finally, the environmental impact per kg product can be calculated, which for global warming is expressed in kg CO₂ equivalents per kg soybeans or orange juice. CO₂

equivalents are the sum of the climate gasses CO₂, N₂O and CH₄ where the gasses are weighted according to their effect on the climate in the atmosphere in relation to CO₂.

We surveyed a number of organic and conventional farms in Jilin, China (soybeans) and São Paulo, Brazil (oranges) and followed the product chains to Denmark. Inputs, outputs and emissions were inventoried on the farms and in the processing and transport. Details can be found in publications on OrganicEprints (Knudsen et al. (2010), <http://orgprints.org/17327/> & Knudsen et

al. (2011), <http://orgprints.org/18417/>).

Transport is responsible for half of the carbon footprint value

The results show that half of the carbon footprint from organic soybean from China was related to transport (see Figure 2). Approximately the same was found for the orange juice from Brazil.

This finding is in agreement with English studies which showed that transport accounted for approx. 40-70% of the carbon footprint of imported plant products transported by ship and/or truck. For meat products though, transport does not

account for a great share (max. 20%) since the total carbon footprint of meat are much higher than for plant products. However, the absolute contribution from transport is of course the same. Figure 3 provides an overview of examples of greenhouse gas contributions from transport when agricultural products are imported from different countries in the world – counted as kg CO₂ equivalents per kg product.

Interestingly, the results show that the same or even more CO₂ is emitted when products are transported by truck from Southern Europe

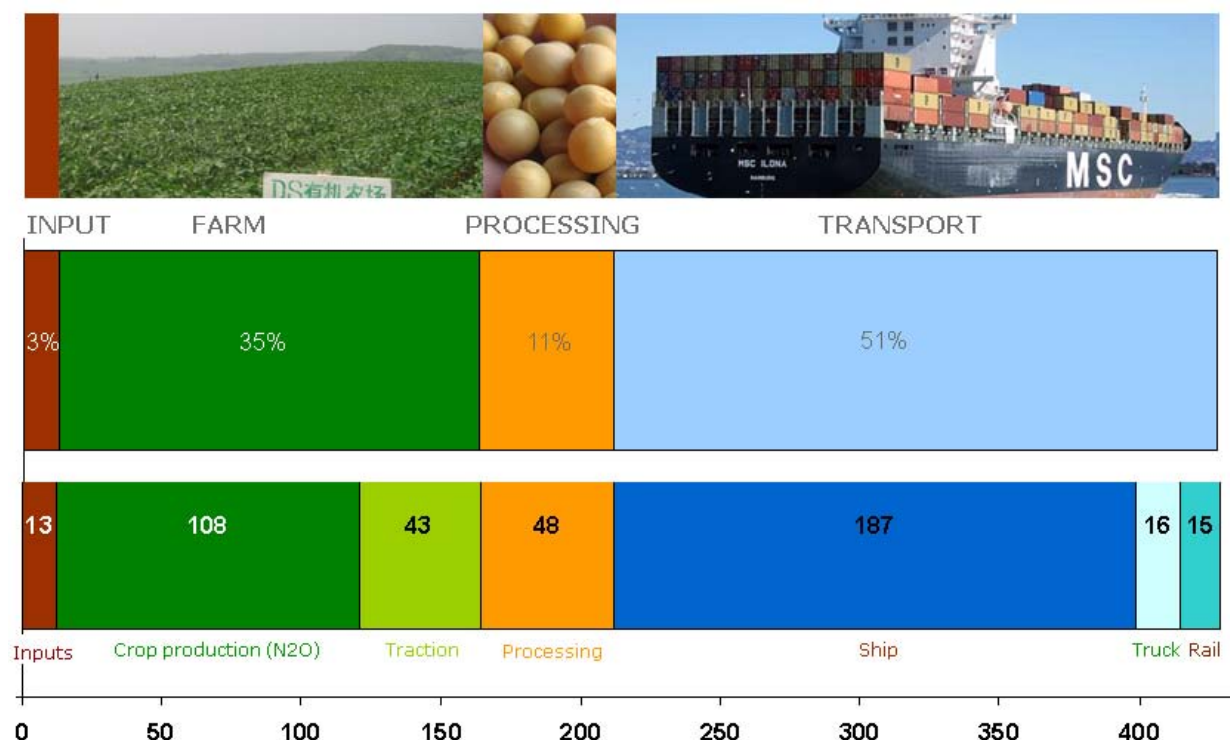


Figure 2. Greenhouse gas emissions from 1 ton of soybeans produced in the Jilin Province in China and transported to the harbor of Aarhus in Denmark (global warming potential (kg CO₂ eq. ton soybeans per year).



as compared to transport from South America by ship. In the total carbon footprint of the product, this contribution from transport should be added to the greenhouse gas emis-

sions from the production. The emissions from the agricultural production can vary depending on whether it is outdoor production with few inputs or production in heated greenhouses,

which has a much higher climate impact.

Difference between organic and conventional soybean

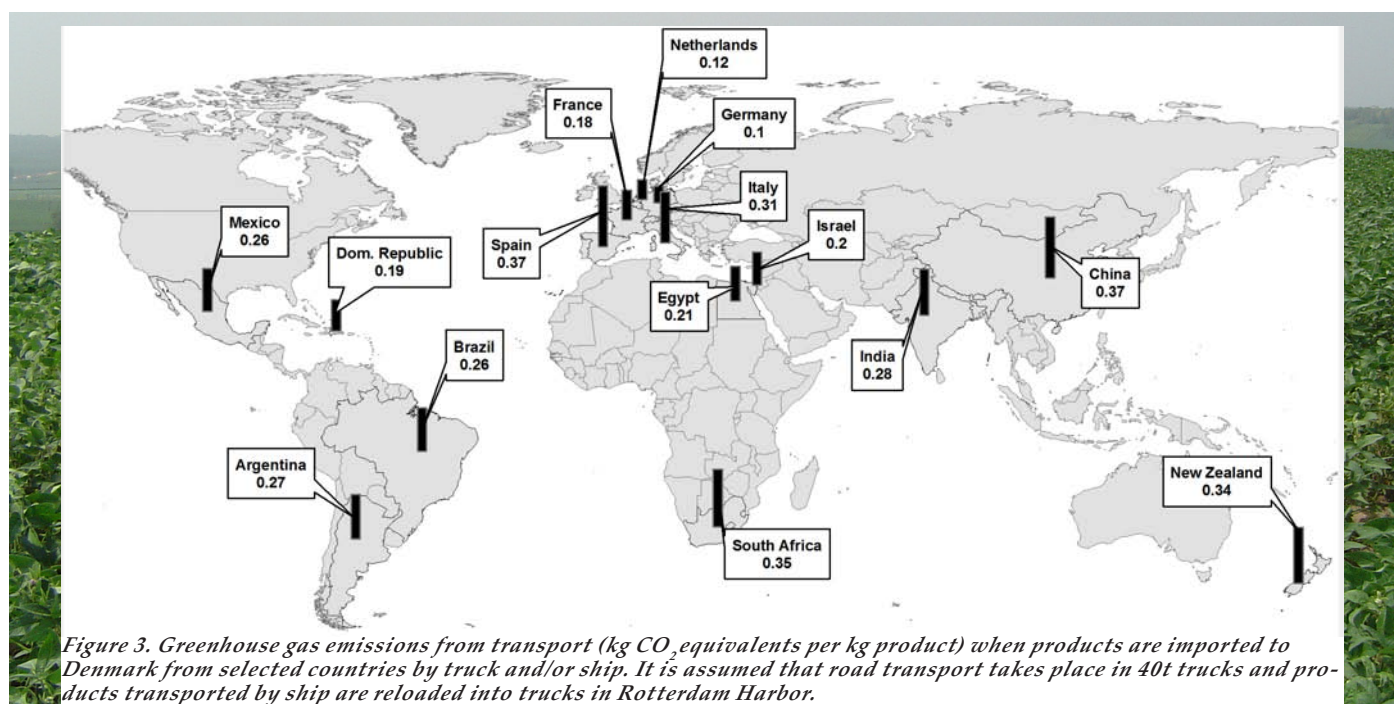
When we focus on the environmental effects of

the farming systems, the results show that the organic soybean produced in the case study area in China has a lower environmental impact than the conventional with regard to greenhouse gas emissions, nutrient enrichment and use of non-renewable energy.

Brazilian orange juice

The results from the Brazilian orange juice are not as straightforward. In the study, small-scale organic and conventional orange plantations were compared. The main differences were the absence of pesticides and higher crop diversity at the small-scale organic farms. Furthermore, the small-scale organic farms were compared to the large-scale organic orange plantations.

The results showed that the large-scale organic plantations had higher greenhouse gas emissions, copper use (towards plant diseases), nutrient enrichment and



lower crop diversity per hectare compared to the small-scale organic farms. The same tendency was visible when the environmental impacts were accounted per kg orange.

These observations suggest that there is a need for more focus on how different certified organic productions comply with the organic ideas and principles. There might also be a need for scrutinizing the organic regulations with regard to regulating especially greenhouse gas emissions and biodiversity.

In the carbon footprint calculations of agricultural products, soil carbon

changes have not traditionally been included in many previous studies.

Results of this study indicate that the difference in carbon footprints of organic and conventional plant products was widened when soil carbon changes was included in the calculations.

Remember other contributions to climate change and other sustainability aspects

In the debate, of how much transport matters when importing organic products, it is important as a consumer to be aware of other food related contributions to climate change that can be

reduced, such as reducing food waste, minimizing unnecessary shopping related transport in cars etc.

Furthermore, it is important to be aware that sustainability deals with many other aspects than climate, such as biodiversity, nutrient enrichment and socioeconomic issues. As a consumer, the choice of which organic products to buy is also related to impact of the agricultural production in the country concerned – both environmentally and socioeconomically.

More information

Read more in the PhD dissertation: "[Environmental assessment of imported organic products : Focusing on orange juice from Brazil and soybeans from China](#)" 2011.



Ecosystem services of biodiversity in organic grasslands



Af Jørgen Eriksen, Department of Agroecology, Aarhus University, Beate Strandberg, Department of Bioscience, Aarhus University, Karen Søegaard, Department of Agroecology, Aarhus University

The use of multi-species mixtures in herbage production can add value in terms of improved conditions for pollinating insects, better resource utilization, carbon sequestration, yield stability, animal health and product quality.

This is the hypothesis of a new project - Eco-Serve - where the goal is to design grasslands, which increase both the nature value and provide an economically sustainable food production.

Grasslands provide a range of services in terms of quality feed, soil fertility and environmental benefits when incorporated into a crop rotation. However, the fields on organic farms are often large and the plant biodiversity is low.

The starting point of a new project is therefore to raise plant biodiversity in order to increase the 'natural value' of cropped land. Biodiversity can be increased by using mixtures of several grass species and inclusion of leguminous and non-leguminous herbs. It is expected especially to affect pollinating insects, which generally are in crisis, and to this end temporary leys are created that can provide flowering plants throughout the growing season.

Additional benefits of multi-species mixtures may be improved animal health and product quality – and in the marketing of livestock products with a 'good story'. The prerequisite for all is that the production level is to some extent maintained, so it at the end of the day is also economically attractive for farmers.

Declining pollinator populations

Pollinating insects are declining, both honey bees and wild pollinators (bumblebees, solitary bees, butterflies and hoverflies). In Denmark, the number of honey bee colonies have dropped by 39% over the period 1985-2005, and although the simultaneous decline in the number of beekeepers (49%) are somewhat reversed, the number of colonies remain small. For wild bees the decline is at least as comprehensive. The Red List includes roughly half of the 29 Danish bumblebee species (41%), 56% of butterflies, 34% of moths and spiders, and 31% hoverflies, but we do not know the status of solitary bees.

There are many possible causes for the decline. Diseases, parasites, abandonment of habitat, fragmentation of landscape, climate change and the intensification of farming are all possible causes. In this project we will therefore investigate whether organic pastures with an increased number of herbs, selected among the so-called bee-plants, and managed with a cutting strategy that ensures



*Grasslands with flowering 'bee-plants' may offer help to pollinators in crisis.
Photo: Karen Søegaard.*

Table 1. Competitiveness of grassland herbs

Strong competitors	Intermediate	Weak
Chicory	Salad burnet	Chervil
Plantain	Birdsfoot trefoil	Sainfoin
Caraway		Melilot

flowers in the field throughout the season will result in more species and a higher number of pollinators.

It is estimated that pollinating insects worldwide contribute to 15-30% of food production and the bees are considered the most important pollinators. The value of pollination in Denmark alone is estimated to approx. 90 million euro per year.

Establishment of niches

Plant species used in leys, are chosen to in order to get quality feed while having a huge production under fertile soil conditions. The most important are perennial ryegrass, white clover and red clover. The huge growth potential of these species and broad growth form make them strong competitors against other species. It is demonstrated by the fact that there are almost no weeds in these fields. When we want to introduce a higher biodiversity, the challenge is therefore to establish niches for less competitive species.

We have started to investigate various herbs sown with clover to assess their competitiveness when they grow directly with the strong competitor clover. There are three strong spe-

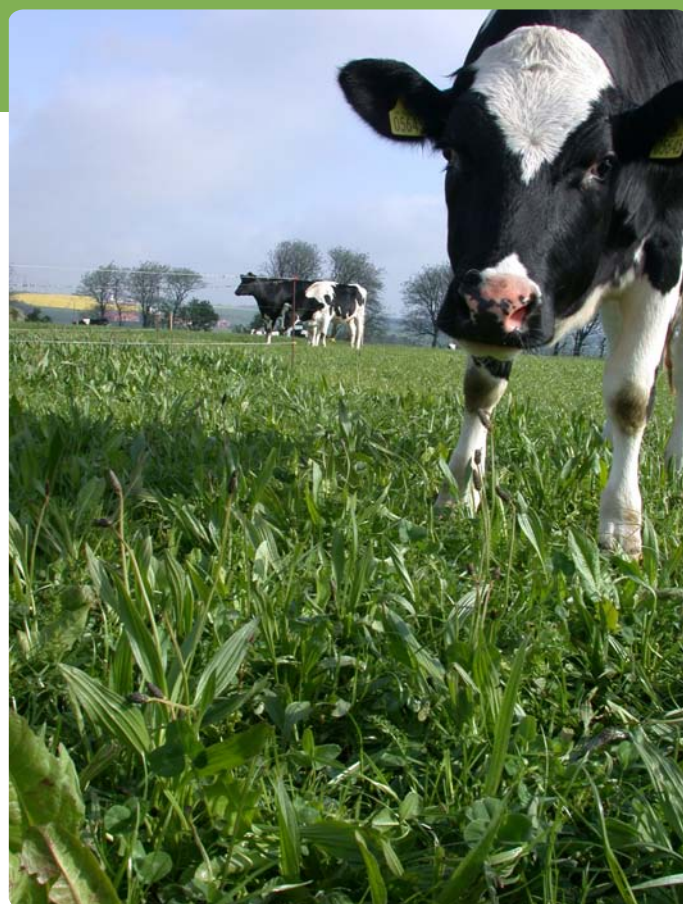
cies, chicory, plantain and caraway (Table 1). If a high biodiversity is to succeed, it is necessary to create architecture in the field with areas that meet the needs of the weak competitors.

To achieve an effect on feed quality, it is necessary that the individual herb is represented in significant quantity in the field, which is less important if the goal is to have a food source for insects. In this project, we explore ways to accommodate both purposes.

Production and duration of 17 different species will be tested in pure stand, including field scabious, red dead nettle, white dead nettle, dandelion, borage and chives. Additionally, we test various two-species mixtures with one leguminous and one non-leguminous species in order to find suitable combinations of less competitive species.

Added value and marketing value

An increased plant biodiversity in grassland not only may improve conditions for pollinating insects, but may also have other positive effects. We will investigate the possibility of increased carbon storage in soil because of deeper root growth and



Multi-species mixtures can increase the use-value of grasslands among other things yield stability and animal health.

Photo: Karen Søegaard.

thus greater sequestration of carbon at depth. Moreover, one project aim is to produce high quality cheese based on hay with many species and develop marketing concepts for such multi-functional organic products. Finally, we will calculate the real value of ecosystem services (pollination, animal health, etc.) and an increased marketing value of quality products with a

'good story'. The project just started and runs until the end of 2013. It is funded by the Green Development and Demonstration Program and follows the chain from the field to the consumer.



Project participants
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More information
 Read more about the Organic RDD project EcoServe on the webpage: http://www.icrofs.org/Pages/Research/organicrdd_ecoserve.html
 Organic RDD is a project under the Danish Organic GUDP Programme, Organic RDD financed by the Ministry of Food, Agriculture and Fisheries.

Innovation research in value chains



By Henning Høgh Jensen et al. Please see the full list of cp-authors on page 18.

In large parts of the Sub-Saharan sub-continent, smallholder agricultural production and food security has remained consistently low¹. Natural resource management is in distress and most rural Africans remain poor and food insecure despite widespread macroeconomic, political and sector reforms.

Most predictions are that these Africans will remain food insecure in the foreseeable future². In this article, the authors present the novel ProGrOV project.

A paradigm that has dominated agricultural research for several decades is that Sub-Saharan African smallholders operate within their production-possibility frontier. However, recently this perception has been challenged suggesting that they produced close to or on the frontier of the capacity of the agro-ecology³.

Innovations are changing the production-market landscape much faster than expected and many smallholders in East Africa are undergoing a profound transition from cereal-based subsistence farming to mixed-enterprise, market-oriented agriculture. Certified organic agriculture is used as a case in the research project "ProGrOV" (Productivity and Growth in Organic Value-Chains), a project that aims at strengthening the farmers' ability to supply the products that the markets require.

Renewed optimism in African countries

A market-oriented agriculture has been promoted by many agents of change. And the change is happening. The last ten years have been characterised by

a renewed optimism, which is taking root in a number of African countries, including Uganda, Kenya and Tanzania, which have demonstrated high economic growth rates⁴. We do not know the winners and the losers yet – just that they are there. Not all farmers will have the capacity to join the market orientations towards high-value commodities. They are simply not able to innovate.

What is innovation?

What is innovation then? Innovation is a buzz-word and there are a multitude of definitions. Within the business management literature, innovation is mostly seen as a tool used by entrepreneurs to create a resource that will give them an advantage over their competitors⁵. Or more broadly, some see an innovation in an idea, practice, or object that is new to the individual, a newness that gives a value to the individual when implemented^{6 & 7}. So we can say that innovation is linked to entrepreneurs and it represents newness, it has a relation to invention or to its process of adoption. As such, innovation is both a process and



an outcome, where the most important final feature may be involving change or a discontinuity with the prevailing product/service or market paradigm.

Local innovation

Local innovation can be triggered by many factors. It may be a farmer that explores new possibilities to solve a problem. Or it may be a social way of responding and adapting to

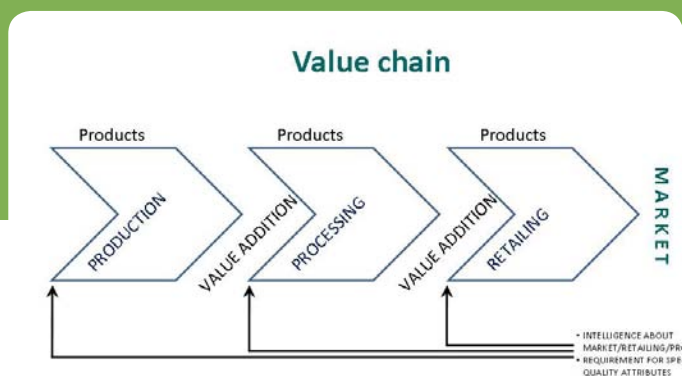


Figure 1. Schematic representation of the value chain.

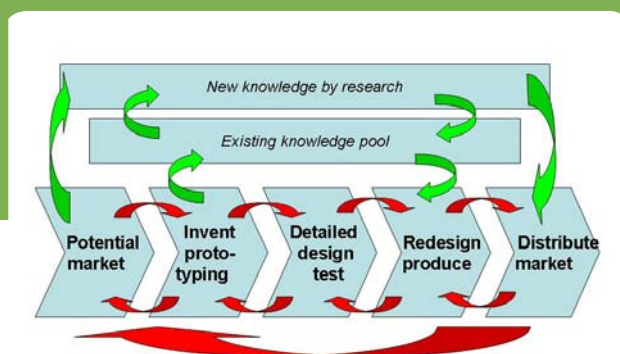


Figure 2. Chain linked model showing flow paths of information and cooperation¹².

changes in access to natural resources, assets, or markets. In this project we focus in particular on the later approach, where we examine the high-value market chain.

This picture illustrates an innovation developed by the entrepreneur AMFRI Farm, a private company in Uganda exporting organic fruits, spices and fruit pulp overseas. The plastic bag contains just two types of chilli peppers, a ginger tuber and lemongrass. Based on this simple innovative combination, the net profit per unit weight of the spice is larger than if sold in bulk.

The innovation – known in the marketing jargon as “bundling” – is that one bag fits into the dinner-shopping of a busy city dweller who likes fresh spices but does not fancy buying a whole lot of each spice. This method of pricing and selling a variety of goods by “bundling” them into one package, allows the

extraction of surplus from customers who have different willingness to pay for the various products. It also adds convenience since all products are packed neatly into one little bag – ready to be shopped and go!

Limitations and barriers along the chain

The basic characteristic of a value-chain is that there is value addition at each step along the chain (Fig. 1). This value-addition happens through the combination with other resources, e.g. manpower, tools, knowledge and skills, and often other raw materials. To enable this value addition, there has to be feedback information from the market or retailers to the processors, the producers, etc. This kind of feedback loops are well known from systems dynamics. In this context, the loops need

to ensure that the recent opportunities and challenges from a dynamic market will be appropriately adjusted by the actors in the chain.

Information flow and interpretative skills

This requires not only information flow but also skills to interpret the signals and react to them. The reactions, for example, may be in the form of new product innovation, which again often requires innovations in the primary production. For smallholder farmers this might be a significant challenge, especially in the absence of significant back-up or support from other chain actors. There are different options to ensure that the value addition is actually beneficial to the weaker agents in the chain, such as poorly organised smallholder farmers⁸.

The research concept that we develop

Traditionally, researchers of innovation in value-chains refer to the general model of Kline and Rosenberg (Fig. 2). However, as this is a research project based on farming, farming products and participation in developing countries, we have tried to add some further ideas on how to research value chains in this context. Stakeholder participation and partnerships are cornerstones in modern paradigms of integrated agricultural research for development (IAR4D) and such new paradigms call for change in the way agricultural research is being conducted^{9, 10, 11}.

Our approach to research value chains is schematically shown in the following diagram (Fig 3). At the bottom of the diagram are depicted the information feedback loops that bring back translated news (signals) regarding market requirements, retailers

Productivity and Growth in Organic Value-Chains (ProGrOV)

Improving productivity and growth in existing organic value-chains in Uganda, Kenya and Tanzania. This is what the research project ProGrOV is about, by way of developing agro-ecological methods, governance and management of chains, and by capacity development regarding research focussed on organic and interdisciplinary approaches.

The project is a collaboration between Universities in Uganda, Kenya, Tanzania and Denmark. It is funded by the Danish Ministry of Foreign Affairs and coordinated by ICROFS.

Read more at
<http://www.icrofs.org/Pages/Research/progov.html>



requests, etc. These signals may include price determining information like preferences for certain intrinsic quality attributes (e.g. maturity, size/weight, uniformity in colour, shelf life). It could also be extrinsic quality attributes such as food safety, production method and the values that are embedded in certified organic, environmental issues or place of origin, which may relate to the concept of the “terroir”. In addition to this complexity, a product may have different markets that emphasise different attributes. An example may be fruits that are needed at different degrees of maturity by two apparently fairly similar markets in Europe. Conversely, it can be a product that is sold both at a local market, which has an emphasis on its role as a traditional dish, and in an export market where it is valued because of its exotic flavour.

The approach to quality in ProGroV research

From the above examples of quality attributes, it may be obvious that it is complicated to describe such quality attributes in a way that makes them “researchable” (quantify and/or qualify, reproducible). For the purpose of the ProGroV project, we have a priori chosen to focus on organic value chains with certain extrinsic quality attributes attached. However, there are still important intrinsic quality attributes which organic products need to fulfil in order to gain market access

at satisfactory prices. Thus, when performing biological/agricultural research in order to improve organic production at field and farm level one needs to take these intrinsic quality attributes into account.

Interpreting the intrinsic quality attributes

These intrinsic quality attributes should be translated into quantifiable quality criteria to be used for assessing the crop and livestock production resulting from the innovations tested in ProGroV. Thus, for example, an indication that the colour of tomatoes is an important attribute for the buyers would then be translated into a scale of percent green parts of a batch of tomatoes, which would then be applied systematically to assess the tomatoes harvested in crop experiments.

The information on the attributes and their prioritization and thresholds etc. will come from interactions with the chain agents e.g. buyers, retailers, hotels, etc., in the relevant ProGroV studies, which deals with the chains.

Thus, product quality in the ProGroV project is a relative and context dependant concept and does not postulate to be neither objective nor covering all aspects of (intrinsic) product quality. However, the interpretation of the intrinsic quality attributes will be in terms of reproducible and quantifiable indicators to be used by the researchers and communicated as part of results.

Projecting the future of the present

Finally, when getting an idea and translating it into an innovation, the entrepreneurs are projecting what philosophers call “projecting the future in the present”. By this they mean that we do neither know the future, nor consumers’ possible preferences – and we base our expectations of consumers’ future behaviour on their current behaviour. If that was true, there would have been no markets for PCs, liquid soap, Facebook, fashion clothes, not to speak of pineapples or bananas in Danish grocery stores.

Stakeholders test the research questions

The upper side of the diagram (Fig. 3) represents the research process, which is informed by the stakeholders, i.e. the national organic organisation, farmers, private companies, and selected markets such as local supermarkets, etc. The research questions and research findings are tested in value-chain stakeholder forums. The tests thus act as dissemination a forum for reality check for the researcher, as well as a forum where the fine-tuning of the research is taking place and actions are taken to adjust the research. The fora obviously differ along the value chain. Thus, if one assumes that a certain input of livestock manure could improve the amount and quality of vegetables, then before testing this intervention experimentally it is

necessary to discuss the feasibility of the intervention with the farmers (i.e. would they potentially be able to find an dose equivalent amounts of manure?).

Intervention incentives for farmers

The starting point for farmers accepting or shunning the intervention during the consultation will be availability or lack of improved breeds of dairy cattle amongst the farmers. One example is the large framed Friesians that consume larger quantities of fodder necessary for producing larger volumes of manure. Given that intensive dairy-vegetable production systems increases the availability of organic fertiliser, which can be applied to the vegetable garden to maintain the quality of the vegetable yield as demanded by the consumers, there might be a strong enough incentive for farmers to accept the intervention. An intensive livestock- vegetable production system helps to diversify farmers’ earnings and empowers them to be less vulnerable against natural and economic shocks associated with the single commodity approach in agriculture. Moreover, interventions on how to handle and use manure as soil amendments has room for improvements in organic agriculture of east Africa since many farmers do not distribute this resource efficiently and sometimes use it in herbal concoctions with tephrosia, paw paw leaves and Mexican marigold to produce



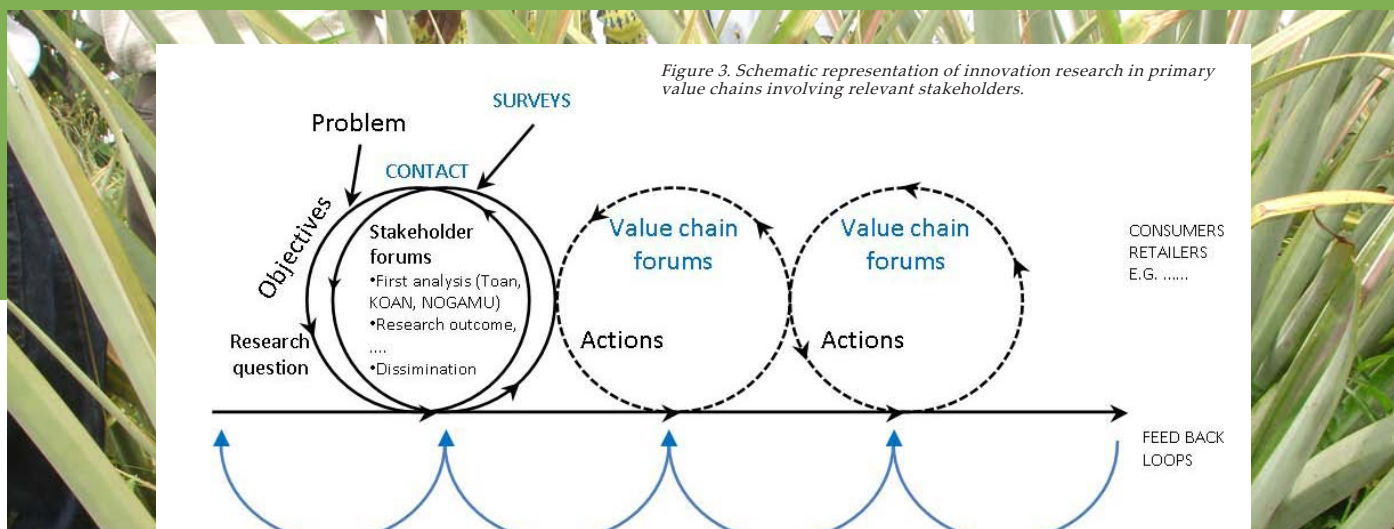


Figure 3. Schematic representation of innovation research in primary value chains involving relevant stakeholders.

organic insecticides.

Value-chain research can help the whole chain

Value-chain research can be said to provide a tool or an interdisciplinary research approach in its own right to help researchers, entrepreneurs, and stakeholders at each part of the value chain, and from multiple disciplines, to identify relevant research questions that can contribute to the whole chain (Fig. 3). This research approach is a further development of the general concepts described in the academic literature (Fig. 2) and emerged at a recent workshop in Uganda where all project participants were gathered to initiate the project. As a first draft, it will be fine-tuned, changed and properly described in the coming years. We would be happy for feedback from anybody interested in this research or research approach.

Further reading

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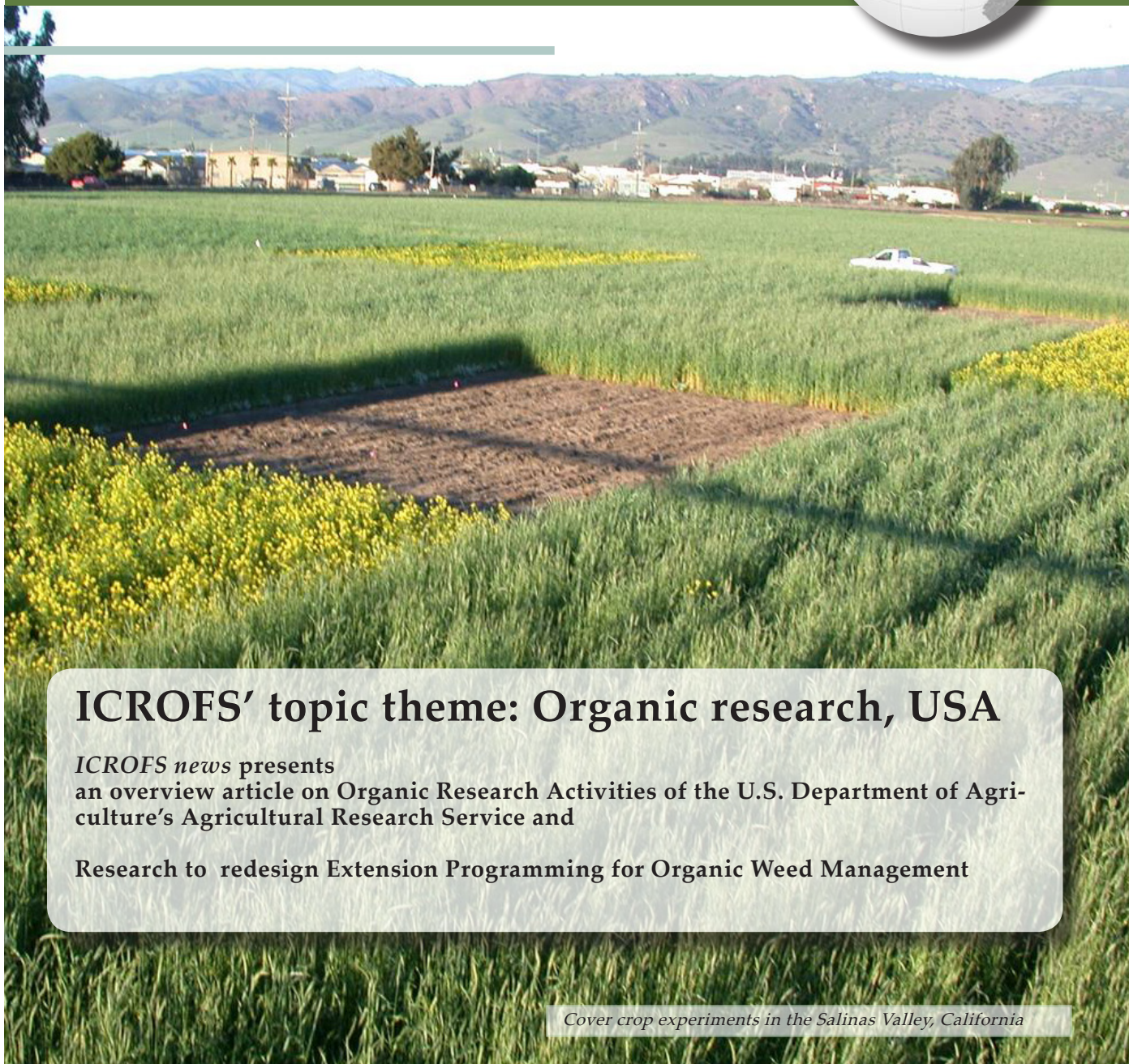
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International organic research



ICROFS' topic theme: Organic research, USA

ICROFS news presents
an overview article on Organic Research Activities of the U.S. Department of Agriculture's Agricultural Research Service and

Research to redesign Extension Programming for Organic Weed Management

Cover crop experiments in the Salinas Valley, California

Current organic research programmes and projects in different countries

In this issue - and in forthcoming issues - *ICROFS news* will bring a number of topic themes presenting current research programmes in different countries on the globe.



Organic research activities of the U.S. Department of Agriculture's Agricultural Research Service

By Matt C. Smith, Ph.D., P.E. National Program Leader, Soil Management, USDA-ARS Office of National Programs



The Agricultural Research Service (ARS) is the Department of Agriculture's (USDA) chief scientific research agency. Our job is finding solutions to agricultural problems that affect Americans every day, from field to table.

Organic research is a vital and ongoing part of the overall ARS research portfolio and occurs at approximately 20 percent of ARS' 100 research locations across the United States.

The vision for ARS organic agriculture research is to help the organic industry overcome the challenges it faces related to productivity, profitability, environmental stewardship, and energy efficiency.

Our interdisciplinary research approach is to understand the biological and physical processes innate to plants, soils, invertebrates, and microbes that naturally regulate pest problems and soil fertility so as to not rely on the use of synthetic pesticide and fertilizer production inputs. A majority of the research effort is devoted to whole-system preventative solutions and, secondarily, to therapeutic controls as rescue practices.

The objective of ARS

The objective of ARS organic agriculture research is to help producers compete ef-

fectively in the marketplace by producing abundant amounts of high-quality and safe products to meet consumer demands. A few illustrative examples of the types of organic research activities being performed by ARS scientists are presented below.

Integrating conservation tillage practices

The challenge of integrating conservation tillage practices into organic production systems is a primary focus of the research at the Sustainable Agricultural Systems Laboratory (SASL) in Beltsville, Maryland. SASL research seeks to address the challenges related to weeds and fertility in organic production. The research is focused primarily on organic grain production but includes practices that are applicable to vegetable production as

well. A major SASL asset is a 16-year Farming Systems Project that compares two conventional and three organic grain crop rotations. Recent SASL research has led to the development of improved cover crops for increased fertility, improved soil conservation, and weed control.

Improved designs for roller-crimpers

A scientist at the ARS National Soil Dynamics Laboratory in Auburn, Alabama, has been developing new and improved designs for roller-crimpers to manage and terminate cover crops while maintaining high residue cover. Numerous designs and prototypes have been developed and tested in varying cropping systems across the State of Alabama. The most recent version is designed for small vegetable production systems and is

powered by a self-propelled, walk-behind garden tractor.

Water quantity and quality

A major environmental contaminant in the Mississippi River Basin is nitrate-N, coming primarily from the discharge of agricultural drainage water and shallow ground water in the Midwest. The best field approach for accurate, integrated measurements of subsurface water quantity and quality is the installation of tile drains and a monitoring system capable of providing accurate and precise estimates of tile drain water flux and nutrient concentrations.

The ARS National Laboratory for Agriculture and Environment in Ames, Iowa, in partnership with Iowa State University, secured funding from the Integrated Organic Water Quality Program



Rolled rye cover crop, organic farm, Queen Anne, MD

(USDA National Institute of Food and Agriculture – NIFA) in 2009 to quantify tile drain water quantity and quality and soil and plant carbon and nitrogen parameters under organic cropping- and forage-based systems. It is hypothesized that integrated, multi-functional organic systems will result in improved water retention and water quality by enhancing $\frac{1}{2}$ carbon, nutrient, and water cycling. This hypothesis will be tested through the collection of soil, plant, and water data for at least 8 years.

Soil and pest management strategies

The objective of an ARS scientist in Salinas, California, is to develop ecologically based soil and pest management strategies that enhance soil quality, nutrient cycling, and profitability and also reduce off-farm inputs in high-value, organic vegetable production systems. He is currently completing the eighth year of long-term systems trials. Organic growers in California often devote 5 to 10 percent of the area in lettuce fields to strips of alyssum. Alyssum flowers attract beneficial insects that provide excellent control of insect pests such as aphids without the need for pesticides.

A 2-year study within the organic vegetable systems trials investigated novel intercropping patterns for organic lettuce and alyssum. The study identified more efficient intercropping patterns that will allow farmers to maximize lettuce yields and obtain the pest control benefits of alyssum. These results will benefit organic farmers and may also help conventional farmers minimize pesticide use in lettuce. Another result



of the research to date is refined cover crop seeding strategies to help organic producers optimize weed control and commercial crop production.

Organic poultry research facilities

ARS is also studying some organic animal-based production systems. The Poultry Production and Product Safety Research Unit in Fayetteville, Arkansas, has developed a state-of-the-art organic poultry research facility. This research farm was Organically Certified in February 2010, and studies are being conducted that focus on production and food safety issues important to organic poultry producers.

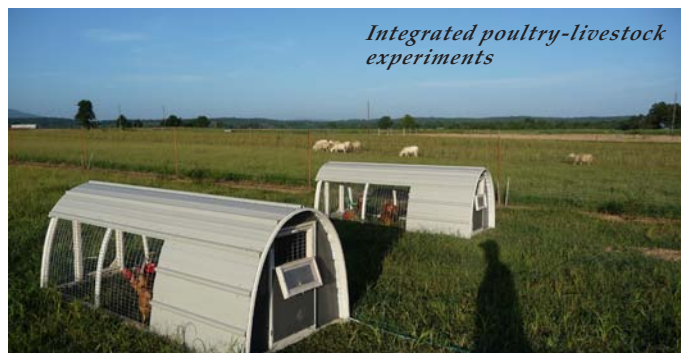
This facility is one of the very few organic-certified poultry research facilities

in the United States. Food safety concerns with *Salmonella* and *Campylobacter* are high-priority research areas for poultry producers, and collaborative studies between the ARS Unit in Fayetteville, the University of Connecticut, and the University of Arkansas have produced several effective strategies to combat these pathogens, including the use of a fatty acid naturally found in milk and coconuts and essential plant extracts that have antimicrobial efficacy.

An Organic Poultry Advisory Board composed of organic poultry farmers from all over the country has been established to provide input on critical research needs. An ARS research unit in Booneville, Arkansas, was awarded a

2010 USDA-NIFA grant to study systems approaches for the control of gastrointestinal nematodes (GIN) in organic small ruminant production. The study will examine forage systems for year-round GIN control; exploit resistant sires, bucks, and breeds to integrate into organic flocks/herds; and examine on-farm use of integrated GIN control.

This short article introduces some of the organic research conducted by ARS. In addition to research conducted explicitly to support organic agriculture, many of the results and lessons learned from non-organic ARS research can be applied to organic farming systems. Examples include plant varieties that are more disease or drought resistant.



More information

If you would like to learn more about ARS activities, please go to our web page at <http://www.ars.usda.gov> and click on the "Research" link.

Mental models and participatory research to redesign extension programming for organic weed management



By Deborah Stinner, Doug Doohan, Jason Parker, and Sarah Zwickle, Ohio State University, USA

The Ohio State University (OSU) is the leader of a multi-state and international project to facilitate integration of experimentally validated methods of weed control into organic farming practice by delivery of audience-specific educational programs that have been informed by in-depth understanding of organic farmers' knowledge, beliefs, attitudes and practice.

The Mental Models project is an international project within OSU's Organic Food and Farming Education and Research Program (OFFER) (described in the last issue of ICROFS News) funded in 2010 by the United States Department of Agriculture (USDA)'s Organic Research and Extension Initiative grants program. The project is led by Doug Doohan, Department of Horticulture and Crop Science at OSU's Ohio Agriculture Research and Development Center in Wooster, OH. It involves additional co-principle investigators from OSU, Purdue University in Indiana, University of Maine, California and Marlene Reimens from Wageningen University & Research Center in the Netherlands.

Weed management - a major limiting factor

Weed management remains a major limiting factor in growth of organic farming in the USA. Good scientific information exists but the usual innovation diffusion approach which US Land Grant University extension uses to deliver information has not proven effective for complex, system-based "soft" technologies (e.g. knowledge) essential for organic farming. Innovation diffusion does not take into account the established learning style of many organic farmers; specifically, a strong preference for farmer-to-farmer networks and learning by doing. Unintentional patronizing attitudes of researchers and extension educators towards farmers,

and assumptions about the factors that influence a farmer's decisions, also contribute to problems.

Frequently, little consideration is given to delivering messages in a way to connect with organic farmers who feel disenfranchised by the system. Agricultural outreach programs that do not consider the audience' strongly held values, beliefs, and on-farm decision making needs are unlikely to be effective. The indifference and antipathy that has developed over the decades between many organic farmers and land grant universities further complicates communication.

Such need not be the case. For example, in the Netherlands, the OVO-model (Research, Extension

and Education) introduced after WW II led to a strong relationship between farmers' organizations and research institutes that holds true today. Organic farming research is planned and conducted in close collaboration with farmers, resulting in methodological developments suited to their needs. As a result, organic farming is more advanced in the Netherlands and other European countries that follow a similar approach than anywhere in the US.

Redesigning US Extension Education

This project calls for redesigning extension education through development of in-depth understanding of the knowledge, beliefs, perceptions, attitudes and practices of organic farmers

Planning session with stakeholders at Asilomar, California.



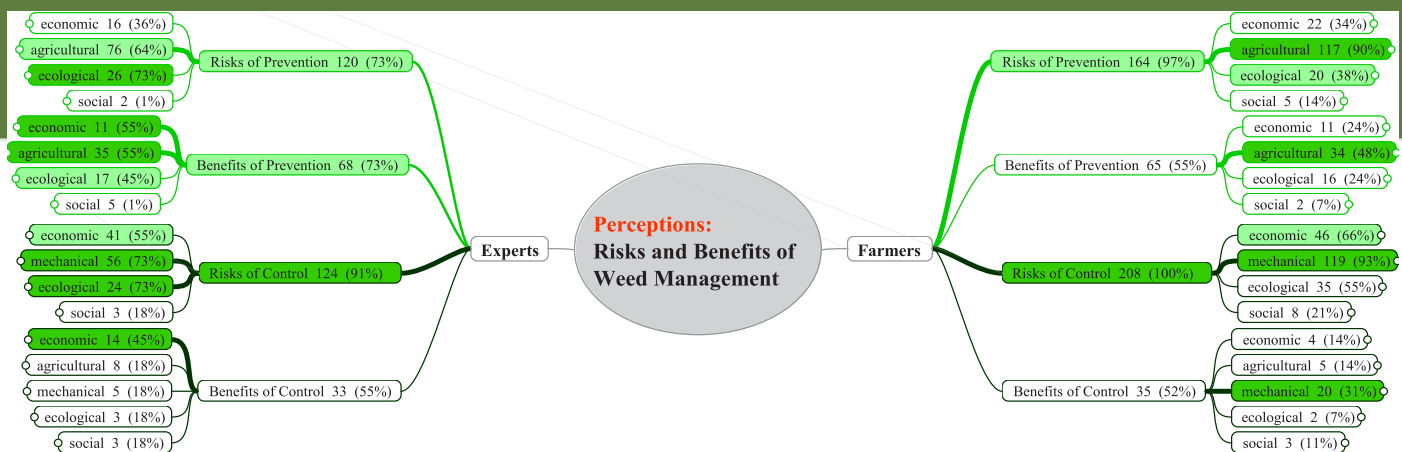


Figure. Expert farmer matrix comparison

pertaining to weed control. This will require integration of an enlightened understanding of growers achieved through development of their mental models. Mental modeling is a well-established methodology that has been the focus of extensive research. Mental models affect how an individual defines a problem, reacts to issues, gathers and processes information, assesses risks and benefits, and makes decisions concerning topics that come to his or her attention through various sources of communications.

Specific project objectives

1) determine the knowledge, beliefs, perceptions, and attitudes that underlie weed management practices used by organic farmers in Ohio, Indiana, California, Maine, and the Netherlands;

2) establish learning communities of growers, researchers and educators within the US's eOrganic Community of Practice (<http://eorganic.info/>) to conduct case-study research on working farms, and outreach on the benefits of crop rotation for weed management; and

3) develop, test, disseminate, and evaluate the impact of differentiated educational programs and communication strategies to encourage adoption of scientifically-validated weed management practices for

organic farming.

Project Progress to Date

The project began in 2010 and has completed objectives for the first two periods. Through in-depth interviews with 11 experts (e.g., weed ecologists and extension personnel) and 29 farmers, an expert model of ecological weed management and a farmer mental model of weed management in the Midwestern United States have been completed.

Figure 1 presents a small section of the side-by-side comparison of the results of expert and farmer risk perceptions of weed management separated into control and prevention-based measures. The number following each conceptual category represents how many times a concept was mentioned during interviews. Frequency of mention reflects the salience of that concept within each mental model.

Frequency is followed by percent agreement among the experts and farmers interviewed. Development of the models identifies gaps in how experts and farmers might perceive the risks and benefits of weed management in order to target outreach and education that addresses these incongruities in perception.

Links with European Research in The Netherlands

A companion study of this project is being conducted in the Netherlands by Dr. Marlene Reimens, of Wageningen University, to understand perceptions of risk among Dutch crop farmers and provide a potentially different model of interaction between farmers and government, as well as organic weed management. Prior research by Dr. Reimen has yielded valuable insights regarding the interrelationships among farmer weed management, risk perception of those weeds, and effectiveness of the strategies that are adopted. This companion study will provide a cross-cultural comparison of organic farmer influence on weed management and approaches to prevention and control.



Graduate Student, Andy Glasser, using GPS unit to sample weed seed bank in cooperating organic farmer's field in Ohio

Call for proposals



CORE ORganic II second call

[Deadline mid-January 2012]

A second CORE Organic II call will be launched in early October 2011. Deadline for pre-proposals will be mid-January 2012. When the call is launched, an ICROFS news feed will be sent to the subscribers.

More details in early October on www.coreorganic2.org.

Events



EU IFOAM Conference: Opportunities and Challenges for sustainable Food Systems

[9 november 2011, Bruxelles, Belgium]

Key features of the IFOAM EU conference are:

- » Examine the relationship between resource efficiency and food security.
- » Explore the role of system approaches to sustainable food and farming.
- » Explore the issues with expert global and regional speakers
- » Share knowledge, exchange ideas and develop solutions.
- » Meet key decision-makers and high-level stakeholders.

Get the draft programme and read more at the IFOAM EU Group website.

Events



Enroll now for the Danish Organic Congress!

[23 - 24 November, 2011, Vingsted Congress Centre, Denmark]

Join the 7th Danish Organic Congress if you speak Danish and wishes to learn about the latest developments and visions of the Danish organic sector.

Together with the Knowledge Centre for Agriculture, Organic Denmark, and the Danish Agriculture and Food Council, ICROFS is co-arranging the 7th Danish Organic Congress. This time, the main focus area and perspective is on the organic farmer. The language of this congress is Danish.

Read more (in Danish) at www.organic-congress.org.



IFSA Symposium:

Producing and reproducing farming systems: New modes of organisation for sustainable food systems of tomorrow.

[July 2012, Aarhus, Denmark]

The International Farming Systems Association (IFSA) – European Group – is a lively network consisting of dedicated researchers and scholars from various fields of research and practices. IFSA is concerned with sustainable development of agriculture from a systemic perspective. Being no formal membership association, all who participate in the biennial symposia are considered part of the IFSA family.

The IFSA Symposium will encompass plenary sessions, workshops, excursions and world cafés, as well as animation/ visualisation events,

Congresses

conference dinner and receptions. As traditionally the case during IFSA Europe symposia, most time will be dedicated to workshops

Read more at <http://ifsa2012.dk>

Workshop: Improving the organic certification system

[14 October, Brussels, 9.15-13.15]

The CERTCOST project arranges a workshop on how to improve the organic certification system. The workshop presents the results and recommendations from the EU FP7 project "Economic Analysis of Certification Systems in Organic Food and Farming", CERTCOST.

Workshop objectives

- » to present and discuss the results and synthesis of the CERTCOST project
- » to critically discuss the project recommendations with stakeholders before they are finalised.

The CERTCOST coordinator will accommodate registrations on a first come first serve basis.

Read more at www.certcost.org.



Media



Video Series - Local Wheat in Denmark

In the fall of 2010, organic bread wheat farmers, millers, and researchers from Maine and Vermont travelled to Denmark to visit with their Danish counterparts.

They learned about production issues, milling techniques, marketing strategies, and heritage varieties. These four series of videos share the tour with you.

Watch the videos on Youtube.

[Thanks to supervising producer Ellen Mallory, Maine, USA]



International Centre for Research in Organic Food Systems



- aiming for the organic principles as the global norm for sustainability

The International Centre for Research in Organic Food Systems (ICROFS) was founded in 2008. The centre is an expansion of the former Danish Agricultural Research Centre for Organic Farming (DARCOF), which the Danish Government gave an international mandate and an international board.

The main purpose of ICROFS is to provide research results that may contribute to the promotion of organic food systems, including agriculture, aquaculture, processing and consumption of organic food.

The vision of ICROFS or the 'Big Hairy Audacious Goal (BHAG)' is that 'organic principles will become the global norm for sustainability in farming and food systems due to evidence based on research and innovation'.